IN THE CLAIMS:

Claims 1-10 (Previously canceled)

Claim 11 (Previously amended): A recorder for recording data on a recording medium, comprising:

a first data output device which outputs sample data, the sample data being formed by sampling information to be recorded at a given cycle and quantizing the thus-sample data into data having a predetermined number of bits;

a re-quantization device which re-quantizes the data output from the first data output device into data whose number of bits is smaller than the predetermined number of bits;

a first writing device which records, at a predetermined recording density, data on a predetermined recording layer of the recording medium on the basis of the data, which has been re-quantized by the re-quantization device;

a second data output device which outputs data, the data being produced by sampling the information to be recorded at a cycle shorter than the predetermined cycle and quantizing the thus-sampled information into data having a predetermined number of bits;

a separation device for dividing the data output from the second data output device into a plurality of sample data sets which have been sampled at the predetermined cycle and at different times;

a subtraction device which calculates a difference between the data output from the re-

quantization device and the predetermined sample data output from the separation device;

a multiplexing device which multiplexes into a single data set the data output from the subtraction device and the sample data, which are output from the separation device but differ from the predetermined sample data; and

a second writing device for recording data on the recording layer of the recording medium on the basis of the data, which have been multiplexed by the multiplexing device, at a recording density higher than that at which the first writing device records data.

Claim 12 (Previously amended): A recorder for recording data on a recording medium, comprising:

a filtering device which limits the bandwidth of information to be recorded to a predetermined frequency bandwidth;

a conversion device which samples the data output from the filtering device at a predetermined cycle and quantizes the thus-sampled data into data having a predetermined number of bits;

a diminishing device which performs a diminishing operation on the data output from the conversion device;

a re-quantization device which re-quantizes the data output from the diminishing device into data whose number of bits is smaller than the predetermined number of bits;

a first writing device which records, at a predetermined recording density, data on a

predetermined recording layer of the recording medium on the basis of the data which have been re-quantized by the re-quantization device;

a separation device for dividing, into a plurality of sample data sets having been sampled at the predetermined cycle and at different times, data which are obtained by limiting the bandwidth of information to be recorded to a predetermined frequency bandwidth, sampling the information at a predetermined cycle, and quantizing the sample-information into data having a predetermined number of bits;

a subtraction device which calculates a difference between the data output from the re-quantization device and the predetermined sample data output from the separation device;

a multiplexing device which multiplexes into a single data set the data output from the subtraction device and the sample data, which are output from the separation device but differ from the predetermined sample data; and

a second writing device for recording data on the other recording layer of the recording medium on the basis of the data, which have been multiplexed by the multiplexing device, at a recording density higher than that at which the first writing device records data.

Claim 13 (Previously amended): A recorder for recording data on a recording medium, comprising:

a filtering device which limits the bandwidth of information to be recorded to a predetermined frequency bandwidth;

a conversion device which samples at a predetermined cycle the data output from the filtering device and quantizes the thus-sampled data into data having a predetermined number of bits;

a diminishing device which performs a diminishing operation on the data output from the conversion device;

a re-quantization device which re-quantizes the data output from the diminishing device into data whose number of bits is smaller than the predetermined number of bits;

a first writing device which records, at a predetermined recording density data, on a predetermined recording layer of the recording medium on the basis of the data, which has been re-quantized by the re-quantization device;

a separation device for dividing, into predetermined frequency bands, data which are obtained by limiting the bandwidth of information to be recorded to a predetermined frequency bandwidth, sampling the information at a predetermined cycle, and quantizing the sampled-information into data having a predetermined number of bits;

a subtraction device which calculates a difference between the data output from the re-quantization device and the data of a certain and output from the separation device;

a multiplexing device which multiplexes into a single data set the data output from the subtraction device and the data of another frequency band output from the separation device; and

a second writing device for recording data on the other recording layer of the recording medium on the basis of the data, which have been multiplexed by the multiplexing device, at a

recording density higher than that at which the first writing device records data.

Claim 14 (previously amended): A recorder for recording data on a recording medium, comprising

a first data output device which outputs sample data, the sample data being formed by sampling information to be recorded at a given cycle and quantizing the thus-sampled data into data having a predetermined number of bits;

a re-quantization device which re-quantizes the data output from the first data output device into data whose number of bits is smaller than the predetermined number of bits;

a first writing device which records data on a predetermined recording layer of the recording medium on the basis of the data, which has been re-quantized by the re-quantization device, at a predetermined recording density;

a second data output device which outputs data, the data being produced by sampling the information to be recorded at a cycle shorter than the predetermined cycle and quantizing the thus-sampled information into data having a predetermined number of bits; and

a second writing device for recording data on the other recording layer of the recording medium on the basis of the data, which have been output from the second data output device, at a recording density higher than that at which the first writing device records data.

Claim 15 (previously amended): A recorder for recording data on a recording medium,

comprising:

a filtering device which limits the bandwidth of information to be recorded to a predetermined frequency bandwidth;

a conversion device which sample the data output from the filtering device at a predetermined cycle and quantizes the thus-sampled data into data having a predetermined number of bits;

a diminishing device which performs a diminishing operation on the data output from the conversion device;

a re-quantization device which re-quantizes the data output from the diminishing device into data whose number of bits is smaller than the predetermined number of bits;

a first writing device which records data on a predetermined recording layer of the recording medium on the basis of the data, which has been re-quantized by the re-quantization device, at a predetermined recording density; and

a second writing device for recording data on the other recording layer of the recording medium on the basis of the data, which have been output from the conversion device, at a recording density higher than that at which the first writing device records data.

Claims 16-28 (Previously canceled)

Claim 29 (Previously added): A recording medium having a plurality of signal

recording layers, wherein

first data are recorded on one of the signal recording layers, and data relevant to the first data are recorded on the other signal recording layer at a recording density higher than that at which the first data are recorded; and

the first data are recorded as data having a predetermined number of bits after having been re-quantized, and the relevant data include differential data pertaining to a difference between the first data and at least a portion of the data on the basis of which the first data have been re-quantized into a predetermined number of bits.

Claim 30 (Currently amended): The recording medium as defined in claim ~~20~~ 29, wherein the recording density corresponds to a recording density with respect to the longitudinal direction of a recording track and/or a recording density with respect to the widthwise direction of the recording track.

Claim 31 (Currently amended): The recording medium as defined in claim ~~20~~ 29, wherein the relevant data complement the first data.

Claim 32 (Currently added): The recording medium as defined in claim ~~20~~ 29, wherein the relevant data are intended to improve the quality of the first data further.

Claims 33-36 (Canceled)

Claim 37 (Previously added): A recording medium having a plurality of signal recording layers, wherein

first data are recorded on one of the signal recording layers, and data relevant to the first data are recorded on the other signal recording layer at a recording density higher than that at which the first data are recorded;

the relevant data are higher in quality than the first data and can be played back solely; and

the relevant data are sampled at a cycle shorter than that at which the first data have been sampled.

Claim 38 (Currently amended): The recording medium as defined in claim ~~28~~ 37, wherein the relevant data are wider in frequency bandwidth than the first data.